

CLAIMS

I/We claim:

- [c1] 1. A computer-implemented method for managing disk bad sectors recovery comprising:

maintaining a bad-sector-mapping table containing a set of bad sector entries and a check sum field, wherein each bad sector entry has a one-to-one correspondance to a reserve sector and contains an address field for storing an address of a bad sector and a header field for indicating the current status of its associated reserve sector;

receiving I/O requests issued from an operating system;

identifying existed bad sectors from said bad-sector-mapping table;

associating the reserve sectors for the recovery;

finding the bad sectors that cause an I/O failure;

rebuilding the data that stored in said bad sector if needed;

recovering the bad sectors and constructing new bad-sector-table entries;

updating a parity block for RAID-type data recovery; and

reporting to said operating system if said I/O request is successful.

- [c2] 2. The method of Claim 1, wherein the header field for each table entry further comprises three bits to flag three situations that may occur to a bad sector within a disk block, including:

a bit to flag a sector pointed by its entry address whether it is a permanent damaged bad sector;

a bit to flag a sector pointed by its entry address whether it is an invalid bad sector;
and

a bit to flag a sector pointed by its entry address whether it is a temporary bad sector.

- [c3] 3. The method of Claim 1, wherein the step of updating the parity block further comprises:
- calculating new data for the parity block;
 - writing new data to the parity block; and
 - updating the BSM table content for sectors with unavailable data.
- [c4] 4. The method of Claim 3, wherein the step of updating the BSM table further comprises:
- constructing new entries;
 - setting the temporary flag "on" for a sector in case when the sector was not listed in the previous BSM table;
 - setting the invalid flag on for a sector in a parity block in case when the sector's data cannot be used.
- [c5] 5. A method of managing disk bad sector recovery comprising:
- maintaining a bad-sector-mapping table containing a set of bad sector entries and a check sum field, wherein each bad sector entry has a one-to-one correspondance to a reserve sector and contains an address field for storing an address of a bad sector and a header field for indicating the current status of its associated reserve sector;
 - checking an I/O request and an I/O result;
 - constructing a new bad-sector entry to the bad-sector-mapping table;
 - identifying bad sectors existing in the bad-sector-mapping table;
 - updating the content of the bad-sector-mapping table;
 - associating corresponding reserve sectors to the system operation;
 - finding bad sectors that causes an I/O failure;
 - constructing new entries into the BSM table;

rebuilding the bad sector data;
recovering the bad sector by using the reserved sector; and
storing the BSM table back to the disk device.

[c6] 6. The system of Claim 5, wherein the step of rebuilding data of a bad sector further comprises:

identifying the RAID type from the system-provided RAID configuration;
reading mirrored data from a RAID-1 or striped data RAID-5 from its
corresponding disk sectors, otherwise indicating an unsuccessful rebuilding;
and
constructing the striped data for the rebuilt sector in the case of a RAID-5.

[c7] 7. The system of Claim 5, wherein the step of recovering data of a bad sector further comprises:

constructing a new entry for the bad-sector-mapping table if allowed;
writing the data of the bad sector into its reserve sector in the case when the bad
sector data is available; otherwise setting the invalid bit on in the case when
the bad sector data is unavailable;
updating a check sum value for a check sum field of the bad-sector-mapping table;
and
reporting whether the operation for recovery is successful or not.

[c8] 8. The system of Claim 5, wherein the step of associating a reserved sector indicated in the BSM table further comprises:

setting the ignore flag of a damage reserved sector on in the case when the damage
flag is true;

freeing the invalid flag of the reserved sector if the association is for a write operation;

reporting unsuccessful association to the system if the invalid flag is set on;

writing data to a disk address indicated in the address field of the reserved sector in case when its corresponding temporary flag is set on;

erasing the corresponding entry by blanking its content;

reporting unsuccessful association if it is a successful writing; otherwise clearing its corresponding temporary flag;

performing read/write data to the reserve sector;

setting the damage flag on in case when read/write data to the reserve sector fails;

constructing a new entry to replace the old one in BSM table;

setting the invalid flag on in case when it is a read operation; and

reporting to the system whether the association is a successful one or not.